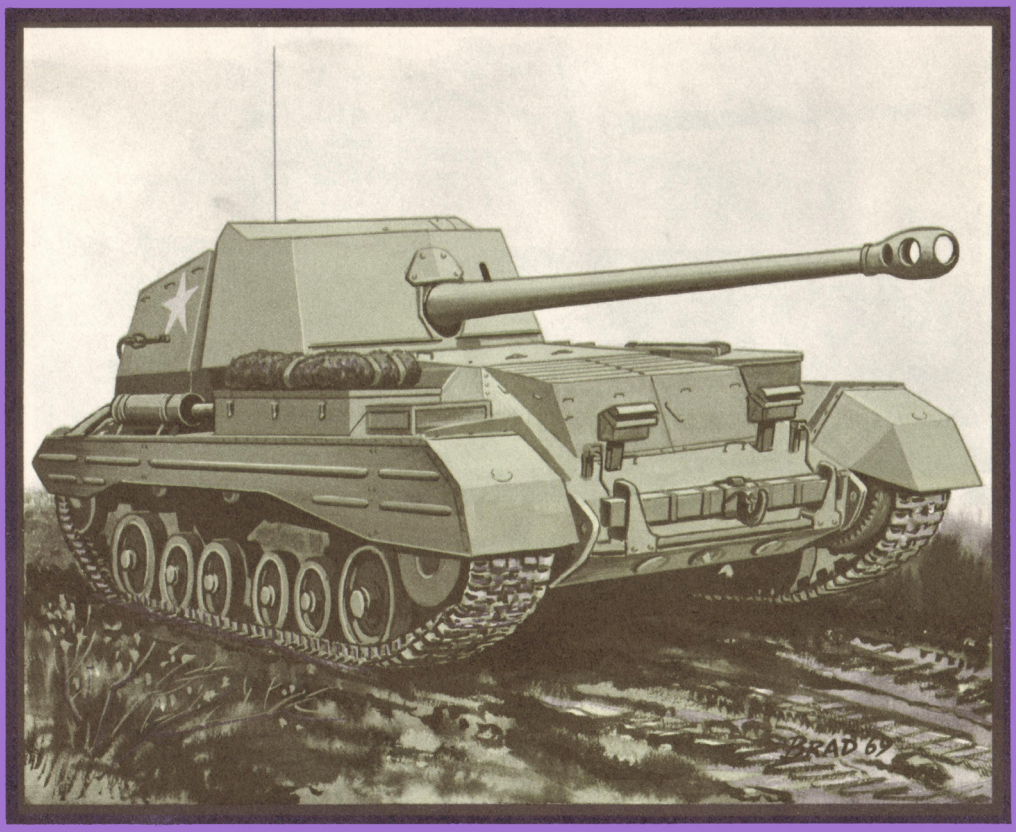
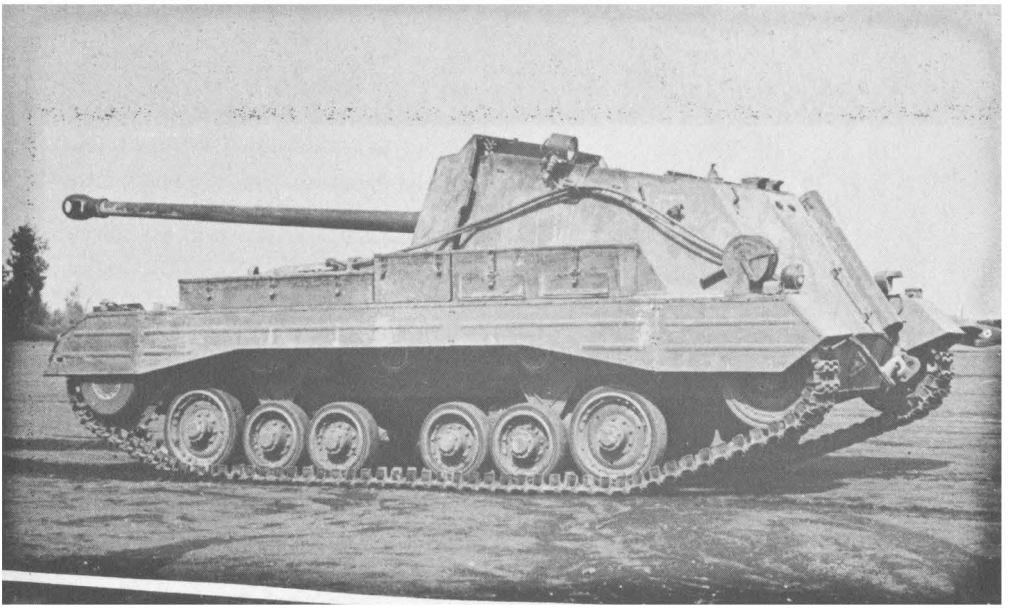


SERIES EIGHTEEN

Valentine 17 pdr. S.P. 'ARCHER' (A 30)	(UK)
Light Tank M2A4	(US)
Panzerkampfwagen E 100 (Double Page) eight view drawing.	(GE)

BELLONA

MILITARY VEHICLE PRINTS

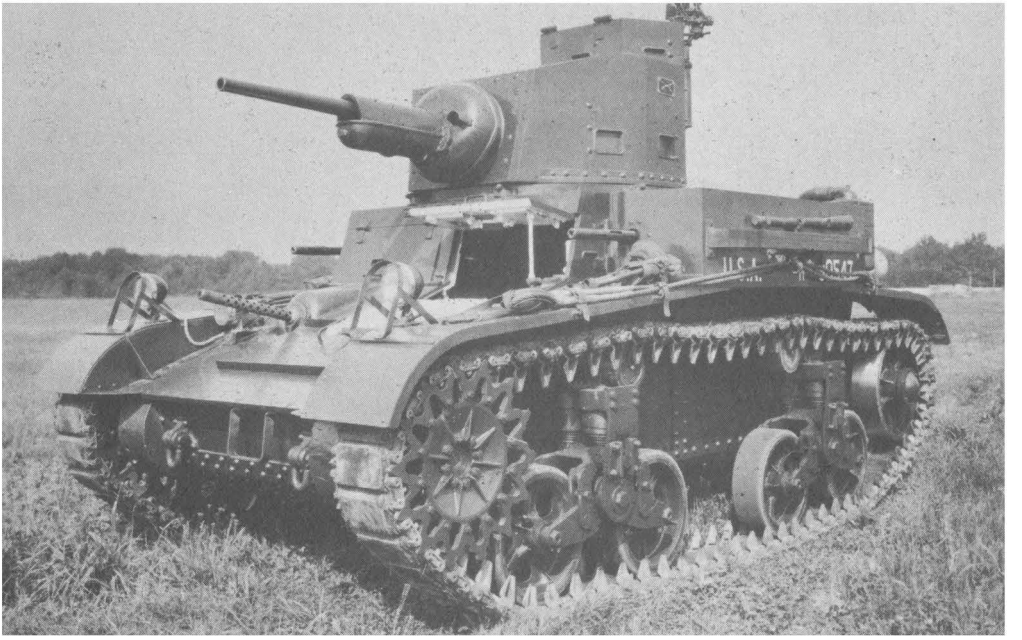


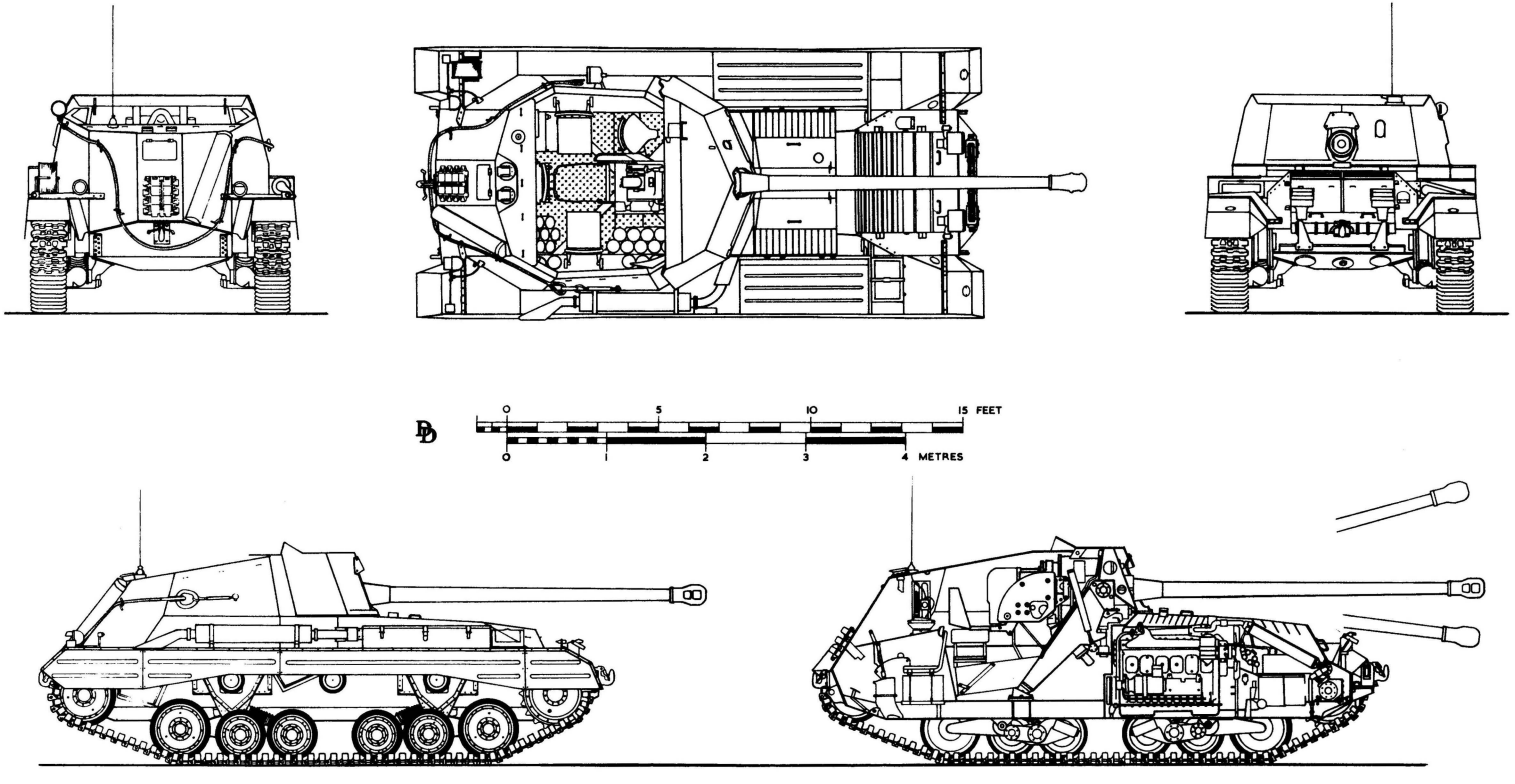
ABOVE: An Archer parked facing in the direction of travel. **The method of pointing** the gun to the rear overcame some of the problems of excessive overhang encountered with high velocity guns. One of the vehicles which suffered most from these problems was the German Jagdpanzer IV mit 7.5cm Stu.K.42 L/70, a very similar weapon to the 17 pdr of the Archer. (IWM PHOTO)

Cover illustration - Drawn by George Bradford

The cover illustration of this issue depicts an Archer in the standard colour scheme adopted during the latter part of the War - plain olive drab with the Allied white star markings. Post War Archers serving with the British forces were finished in Olive Green with the usual unit markings. Some Archers were supplied to Egypt in the early fifties and were painted sand colour, to blend in with the local conditions. These Archers carried the Egyptian crescent in green on the super-structure sides. Approximately 40 of these were captured by Israel in 1956. The vehicle in the illustration is in firing order viewed from the rear.

BELOW: The M 2A 4 was a pre-war design which had a profound effect on later American light tanks which were all directly based upon features which were proven in the M2 series. Some M 2A 4 were supplied to Britain under Lease-Lend but these, like those employed by the U.S. Army, were used only for training pending delivery of the more advanced M 3 'Stuart' (Bellona Prints Series 12, No.46 US) (U.S. Official Photo)





SELF PROPELLED 17 POUNDER ARCHER

SCALE 1:76 (4mm to 1 foot) Drawn by D.P.DYER

Self Propelled 17 pdr. 'ARCHER' 1943/45.

The weight of the 17 pdr Anti-Tank Gun mounted on the normal wheeled carriage was in the region of 3 tons. (The 6 pdr Anti-Tank Gun weighed 1 ton) Due to this high weight it was felt that the combat mobility would be impared and this would relegate the 17 pdr to a purely static role, requiring a tractor to haul it both into and out of action. It was realised early on, that in order to overcome this prob-em, a self propelled mounting was a necessity. Whilst the ideal situation was to have the 17 pdr turret mounted in a tank, no British Tanks, in production at the time, had a large enough turret ring diameter for this purpose. It had been anticipated that it would have been possible to mount the 17 pdr on the latest Cruiser Tank the 'Cromwell', the pilots of which were completed in January 1942, but the turret ring diameter of this also proved too small.

The A.29 Specification had been issued for a Rolls Royce Design Heavy Cruiser of 45 tons mounting the 17 pdr, but this was abandoned at the paper stage.

The General Staff had hopes for the U.S.3" GMC M 10 as a Self Propelled Anti-tank Gun, but by July 1942 it was clear that few of these would be available before 1943. Finally, in view of the urgency of obtaining a self propelled mounting for the 17 pdr, the A 30 Specification was issued. Work was started on designs, utilising the chassis of the 'Cromwell' which lead to the 'Challenger', (Bellona Prints Series 13. No.52 UK) and 'Avenger'. Meanwhile consideration was also given to adapting current designs in production.

Investigation showed that very little protection could be provided on the 'Crusader' chassis, so the 'Valentine' chassis was adopted as the best alternative. A completely new armoured superstructure was built on the basic 'Valentine' hull back as far as the engine bulkhead. This new superstructure had an open top. Construction was of welded armour plate 20 mm thick on surfaces most likely to be hit. Other than the sides of the hull most surfaces were angled to improve protection as far as possible. The engine covers of the 'Valentine' Tank were redesigned to suit the configuration.

The driver was in his normal position while the 17 pdr was directly behind him facing rearwards. The Commander sat behind the driver to his right and the loader also behind him to his left. The Commander and loader both faced each other. The gunner sat to the left of the gun facing rearwards, namely in the direction the gun pointed. Limited traverse of 22½ degrees was provided to both the right and left of the centre line of the vehicle. The gun shield which formed the 'rear' of the fighting compartment traversed with the gun. Elevation from plus 15 degrees to minus 7½ degrees being provided.

The first two "pilots" were completed by mid 1943, at which time an order for 800 vehicles was placed. Early in March 1944 the first 'Archer' was delivered to the Fighting Vehicles Research and Development Establishment at Chertsey for trials which resulted in slight modifications being recommended for the production vehicles.

Units equiped with the new 'Archers' arrived in North West Europe in October 1944 and were used in action shortly afterwards. 'Archers' were active in service until the end of the War in Europe and continued as Anti-tank vehicles with the British Army till the fifties. They served with the Anti Tank Regiments of the Royal Artillery who found them far superior to towed 17 pdrs. Having a low silhouette, they were highly successful when used from ambush, the rearwards gun being an advantage in allowing them to pull out away from the enemy when located. Whilst a radio was carried, Archers were also equipped with a field telephone. The wire for the telephone was carried on a drum outside the vehicle at first, as shown in the drawing, but later, in the position occupied by the spotlight. Provision was also made for stowage of a 2" mortar, while a Bren gun was carried for anti personnel defence.

In all 655 'Archers' of the original order for 800 were completed.

Technical Specification for Valentine 17 pdr. S.P. 'Archer' (A 30)

Crew: 4
Weight, Combat Loaded: 35,840 lbs. 16 Long tons.
17.92 Short tons. 16.25 Tonnes.

Performance

Speed, Max.Road: 20 m.p.h.(32.2 Km.p.h.)
Cross country: 10 m.p.h. (16.1 Km.p.h.)
Max. Gradient: 32 degrees.
Fording depth: 3' 0" (91.4 cm)
Trench crossing: 7' 9" (236 cm)
Step: 2' 9" (83.8 cm)
Min.Turning circle. Skid.
Ground pressure: 10.3 lbs/sq.ins (0.724 Kg/sq.cm)
Range (internal fuel), Road: 140 miles (225 Km)
Cross country: 75 miles (121 Km)

Dimensions

Length overall: 21'11" (668 cm)
Length: 18' 6" (654 cm)
Width overall: 9'0½" (276 cm)
Height: 7'4½" (225 cm)
Ground clearance: 1' 4" (40.6 cm)
Fire height of gun: 6'8½" (204 cm)
Road wheel dia (overall) 2'0" (61 cm) & 1'7½" (49.5 cm)

Trackwork

Centres: 7' 3" (221 cm)
Length on ground: 10' 2" (310 cm)
Width: 1'2½" (35.6 cm)
Pitch: 4.36" (11.4 cm)
Number of links per track: 103. Type: Single pin, Manganese Steel.

Mechanical Details

Engine: General Motors 6 - 71 m 6.97 litre. Two stroke diesel, Water cooled six cylinder in line. 192 bhp developed at 1900 rpm.
Transmission: General Motors. Dry disc single plate clutch, Spicer 5 forward 1 reverse gearbox
Steering: Clutch and Brake.
Suspension: 4 triple wheel bogies with single coil spring.

Armament

Main: 17 pdr. QFSA Mk. II.
Calibre, and length in calibres: 76.2 mm (3 ins), L/60.
Traverse: 22½ degrees to right and 22½ degrees to left.
Operation: Hand.
Elevation: Plus 15 degrees, minus 7½ degrees.

Secondary Armament: 1 x 0.303 Bren.

Stowage

Ammunition, main armament: 52 rds.
Ammunition, secondary armament: 24 x 30 rd magazines.
Internal fuel capacity: 50 Imp.gals. 60 U.S. gals. 227 Litres.

Armour

Type:
Hull, Nose upper: 0.787" (20 mm) at 33 degrees.
Nose lower: 0.787" (20 mm) at 20 & 72 degrees.
Sides, upper: 0.787" (20 mm) at 12 degrees.
lower: 0.787" (20 mm) at 0 degrees.
Rear: 0.787" (20 mm) at 0 & 30 degrees.
0.551" (14 mm) at 60 degrees.
Engine covers: 0.393" (10 mm) at 83 & 88 degrees.
Belly: 0.393" (10 mm) at 360 degrees.
Gun Shield: 0.787" (20 mm) at 20 degrees.
Vision: Periscopes.
Communications: 1 x No.18. WT Set plus transmitting set CSL/126/14.

NOTE: British Standard Angles: 0 degrees = Vertical
90 degrees = Horizontal.

PANZERKAMPFWAGEN E 100 1941-45

Historical research by Walter J.Spielberger.

A report, made in 1945 upon allied insistance by Dir.Jenschke of Adler, gives an indication of the development of a new "Entwicklungstypen" series of tanks contemplated by the German Ordnance Department.

According to this report, all existing tanks in inventory at that time were to be replaced by new armored fighting vehicles. The main purpose behind this program was to achieve higher yet cheaper production through standardization and simplification. Five different tracked vehicles were envisaged:

1. Trial code number E 10 - a small tank of 10-15 tons.
2. Trial code number E 25 - a tank of about 25-30 tons.
3. Trial code number E 50 - a medium tank of about 50 tons to replace the "Panther".
4. Trial code number E 75 - a heavy tank of about 75-80 tons to replace the "Tiger".
5. Trial code number E 100 - a super-heavy tank of about 130-140 tons.

Characteristic of all these tanks was the use of rear sprockets (with the exception of the E 100), the replacing of the double guide tracks with single guide ones and single tooth sprockets.

Torsion bar suspension was to be eliminated in favor of a Belleville washer type suspension, which could be fitted externally and which did not interfere with the interior of the vehicle.

The only vehicle of the new series which was almost completed by the end of the war was the heaviest, namely the "E 100". This design was born during a conference with Hitler in November of 1941, when a super-heavy tank was demanded. Prof. Porsche at that time commenced with the development of the "Maus". Waffenamt, always using at least two competing firms for any of their developments, ordered Adler of Frankfurt to participate. Work on their project started in June 1943. Hitler's order of 1944 to stop development work on super-heavy fighting vehicles for the rest of the war was by-passed and the construction of the Adler prototype proceded slowly but surely until the end of the hostilities. Assembly of the "E 100" components took place in Haustenbeck, near Paderborn, where Henschel mainatined a small research facility.

The following extract from a progress report on the construction of the E 100, dated 15th of January 1945 gives an interesting insight into the state of completion and the difficulties experienced by this low priority project.

> Due to many difficulties caused by war conditions, it was not always possible to receive missing parts at the time they were needed, therefore the assembly of the vehicle was slowed down. It should be pointed out that only three employees of the Adler plant are available for this work.
>
> The missing coil springs which are necessary for the suspension assembly have been miss-sent due to some mix-up. The three Adler employees inform me that the assembly of the suspension can be completed as soon as the missing coil springs arrive.
>
> In regard to the track, we have only received the transport track, the combat track has not yet arrived.
>
> Parts for the assembly, which lies between the bulkhead and the rear wall, are on hand except for the missing fuel leads.
>
> The parts which were needed for the fighting compartment and inside apparatus have arrived and are being installed. Further photos will be made after the assembly has been completed. The drive of the sprocket is accomplished through the final drive with brakes, steering mechanism, change speed gear box, propeller shaft from the engine.
>
> The cover plate for the main gear box and the steering gear has not arrived.
>
> The electrical installation will be made, after the missing gear cover plate on which the instrument panel is mounted arrives. As soon as the fuel leads arrive and the electrical installation has been completed, the transmission can be tried out. Henschel will be told about the delivery of the new cover plate. A list will be made of the small missing parts so that they can be delivered in the shortest possible time by the Adler plant.
>
> As to information about the turret. Neither the date of delivery of it nor the equivalent travelling weight is known, we want to know how the situation stands. This question is brought up so that the equivalent weight can be transported by me from the experimental area to the assembly shop. When the dimensions and the weight are known to me transport can be arranged.

At the time, when the vehicle was captured by the Allies, the chassis was almost completed with only some of the suspension components still missing. Battletracks and the 15 cm gun had also arrived. All the parts were shipped to England, where the vehicle was displayed at Bovington.

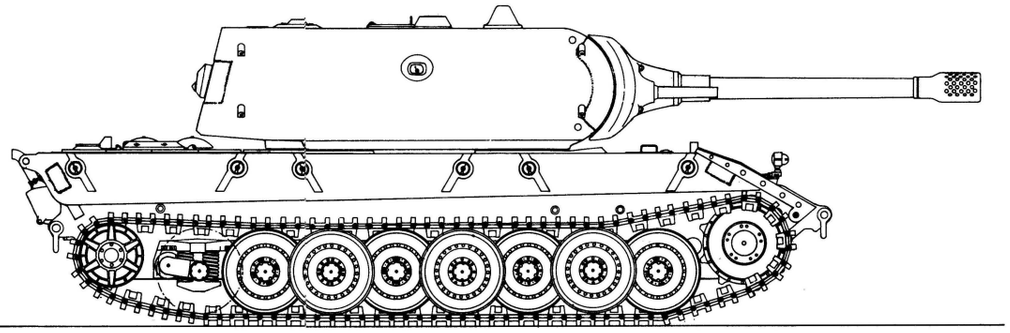
For test drives, a regular "Tiger" engine was to be installed, which was supposed to be replaced later on by a modified Maybach engine, the "HL 234". Drive train components were also taken over from Henschel developments, such as a OLVAR transmission and an "L 801" steering mechanism. Tracks had to be redesigned by Adler and Skoda and had a width of 1000 mm.

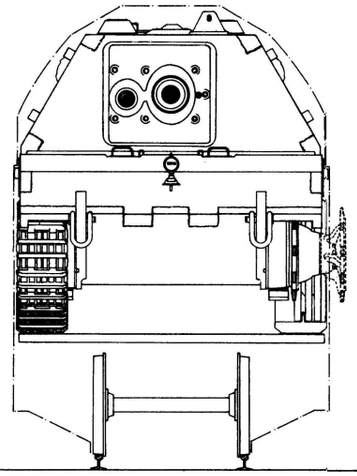
To transport the vehicle on railroad flatcars, the curved armored side aprons and battle tracks had to be removed. Armor plating was substantial with 200 mm front armor at 45 degrees provided. A turret was never completed, though it was intended to use one similar to that already fitted on the "Maus" 2nd prototype. But the turret was to mount either a 174 mm or a 150 mm high velocity weapon. Indication during the completion phase of the vehicle, however, pointed toward a final "Limited traverse" configuration for the unit. To accomodate such weapons in a 360 degrees traverse turret would have asked for a turret race diameter larger than the proposed one of 3060 mm.
Any increase of this nature would have left the chassis too wide and transportation of the tank would have been made impossible.

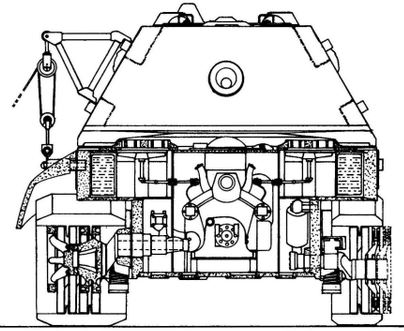
In spite of the proposed increase in "horse power" to weight ratio through the installation of the improved Maybach engine and a modified transmission/steering gear combination "MEKYDRO", the performance of the vehicle with 8, 5 hp per ton was completely inadequate.

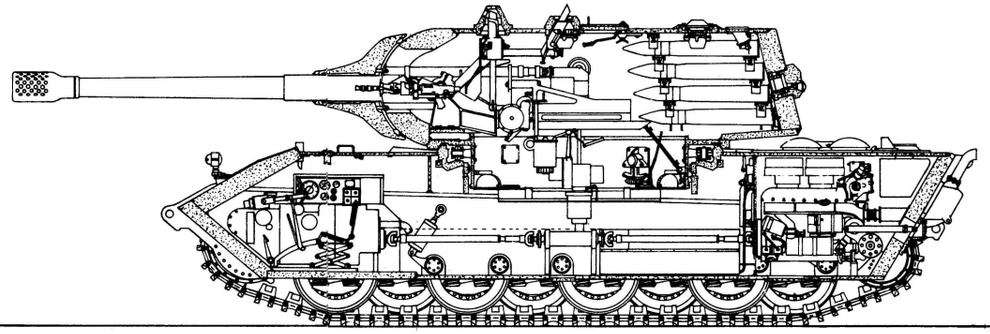
The drawing is completed to show the E 100 in its proposed completed form. The first page shows the vehicle in battle order with battletracks and side shields fitted. For transportation these shields were to be removed. As indicated on the end section this was to be effected with a jib and winch attached, as required, to the turret sides. Due to the size and weight of these shields, it must be assumed that such a method of removal was for emergencies only, and that a crane vehicle would normally be available.

The 1000 mm wide battletracks were to be replaced by 550 mm ones. The wheelwork was to be narrowed by removal of the external wheel of the outer pairs which were fitted to the 2nd, 4th 6th and rear axles as shown hatched on the end section. The drive sprocket was designed so that the outer sprocket could be removed,while the idlers was basically that of the "Tiger" Ausf B (Bellona Prints Series 2. No.8 GE) with an extension piece which could be removed as required. The view of the vehicle facing from left to right shows an E 100 in transportation order. The final road wheel has been ghosted to reveal the suspension details.









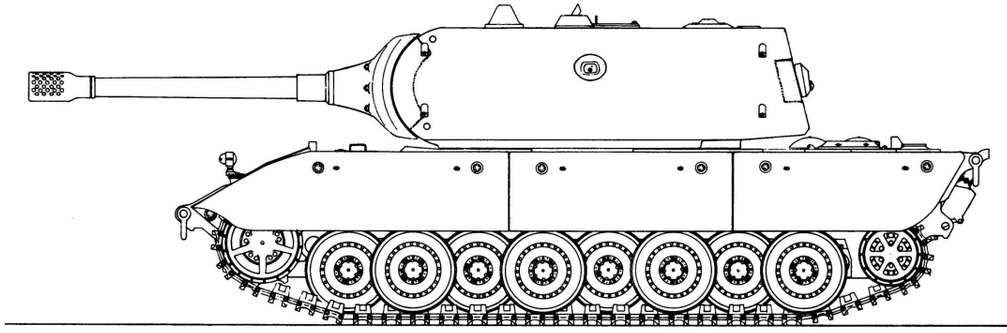
H&D

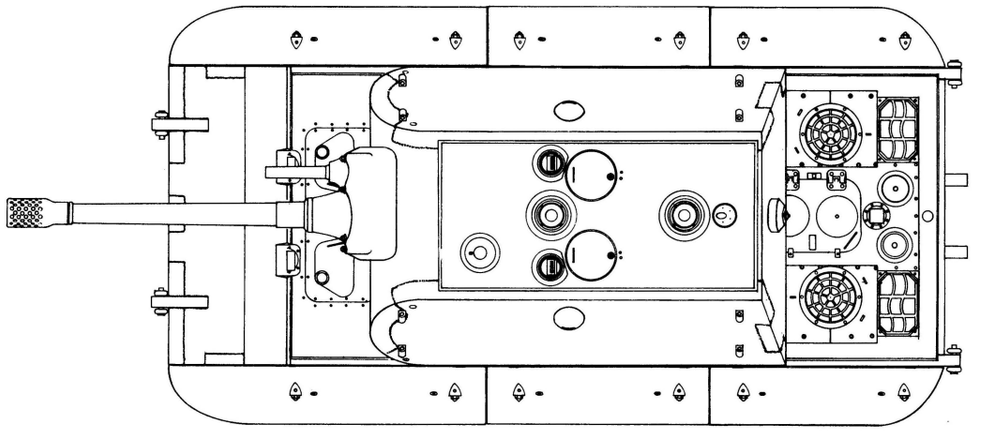
0 5 10 15 FEET

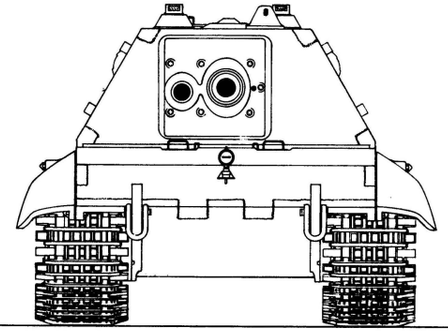
0 1 2 3 4 METRES

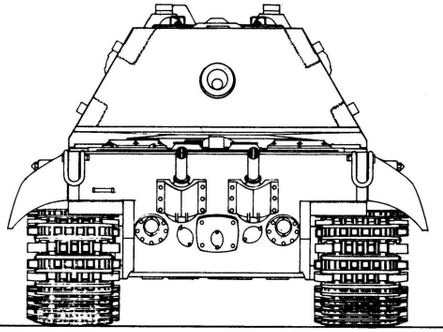
PANZERKAMPFWAGEN E-100

SCALE 1:76 (4 mm to 1 foot) DRAWN BY H.L. DOYLE.









H&D

0 5 10 15 FEET

0 1 2 3 4 METRES

PANZERKAMPFWAGEN E-100

SCALE 1:76 (4 mm to 1 foot) DRAWN BY H.L. DOYLE.

The front view of the E 100 in transportation order show it mounted on a rail flat car. The brokem outline enclosing the vehicle and flat car is the Rail load guage. Anything projecting beyond these lines will faul bridges, platforms etc. As can be seen the E 100 would have been just within the permissable limit. The outer section of the drive sprocket, which was to be removed for travelling is shown hatched on this view.

While the E 100 remains an interesting project in retrospective as on many occasions before, it was proven beyond doubt that a technical solution without considerations for tactical employment was no solution at all. Every effort in this direction had to be considered waste.

Grateful thanks are tendered to A.L.Sohns for his assistance in research on this vehicle.

Technical Specification for Panzerkampfwagen E-100.

Crew: 5
Weight, Combat loaded: 308660 Lbs. 137.8 Long tons,
154.33 Short tons. 140 Tonnes.

Performance

Speed, (Prototype) Max. Road: 14.29 m.p.h. (23 Km.p.h.)
(Series) Max. Road: 24.85 m.p.h. (40 Km.p.h.)
Fording depth: 6' 2⅜" (190 cm)
Step: 2' 11½" (90 cm)
Min.Turning circle. 26' 2" (8 metres)
Ground pressure 19.912 Lbs/sq.ins (1.4 Kg/sq.cm)
Range (internal fuel) Road: 74.5 Miles (120 Km)
Power to weight ratio: (Prototype) 5 metric HP/ton
(Series) 8.5 metric HP/ton.

Dimensions

Length overall: 33' 8" (1027 cm)
Length: 28' 6½" (870 cm)
Width overall (Battle order) 14' 8½" (448 cm)
Width: 10' 9½" (329 cm)
Height: 10' 10¾"(332) cm)
Ground clearance: 1' 7¾" (50 cm)
Fire height of gun: 8' 4" (254 cm)
Turret ring dia: 10' 0½" (306 cm)

Trackwork

Centres: (Battle Tracks) 10' 1" (307.5 cm)
Centres: 9' 7" (292 cm)
Length on ground: 16' 1" (490 cm)
Width:(Battle Tracks) 3' 3"(100 cm)
Width: 1' 9¾" (5.5 cm)

Mechanical Details

Engine: (In Prototype) 1 x Maybach HL 230 P30 V 12 (60 degrees)
OHV Water cooled Petrol of 23.88 litres developing 700 bhp (metric) at 3000 rpm.
(In Series) 1 x Maybach HL 234 developing 1200 bhp at 300 rpm.
Transmission: (In Prototype) Maybach "Olvar" type B 40 12 16 8F - 4R speeds.
(In Series) Maybach "Mekydro" 8F - 4R speeds.

Armament

Main: 1 x 17 cm KwK 44 or (15 cm in DRG)
Calibre, and length in calibres: 174/150 mm, (6.85/5.9 ins) L/38.
Traverse: 360 degrees turret.
Elevation: plus 23 degrees, minus 7 degrees.

Secondary armament: 1 x 7.5 cm KwK 44 L/36.5 Co-Axial.
1 x 7.92 mm MG 34 Co-Axial.
2 x 9 m.p. 44 - Ball mounts in turret sides.

Stowage

Ammunition: Main Armament: 32 rds in turret - total unknown.
Ammunition: 7.5 cm 200 rds.
Internal Fuel capacity: 264 Imp. gals. 317 U.S. gals. 1200 Litres.

Armour

Type: Rolled homogeneous plate interlocking stepped joints, welded construction.

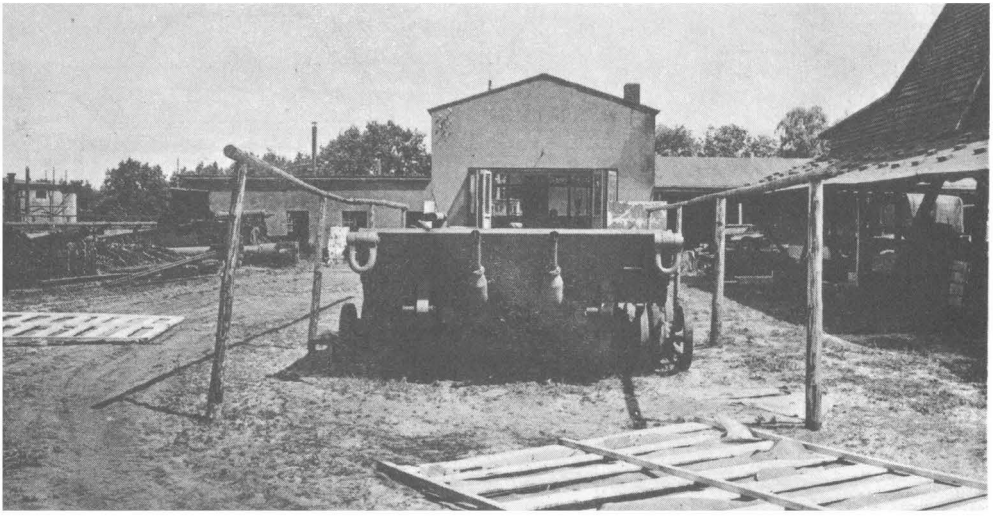
Hull, Nose upper: 7.873" (200 mm) at 30 degrees.
Nose lower: 5.905" (150 mm) at 50 degrees.
Sides, upper: 4.723" (120 mm) at 90 degrees.
Rear: 5.905" (150 mm) at 60 degrees.
Decking: 1.574" (40 mm) at 0 degrees.
Belly, Front: 3.149" (80 mm) at 0 degrees.
Rear: 1.574" (40 mm) at 0 degrees.

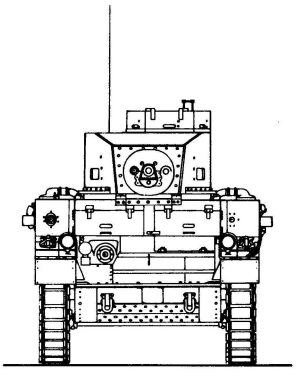
Turret

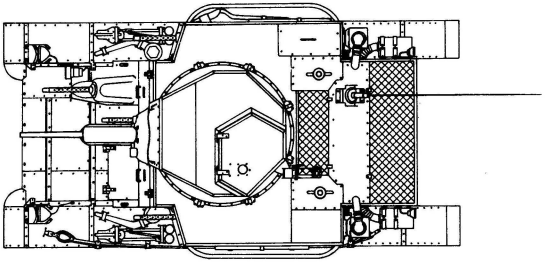
Front: 9.448" (240 cm) Rounded
Sides: 7.873" (200 mm) at 60 degrees.
Rear: 7.873" (200 mm) at 83 degrees.
Roof: 1.574" (40 mm) at 0 degrees.
Mantel: 7.873" (200 mm) Average.

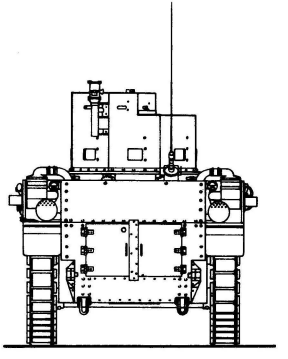
NOTE: German standard Angles; 0 degrees - Horizontal.
90 degrees - Vertical.

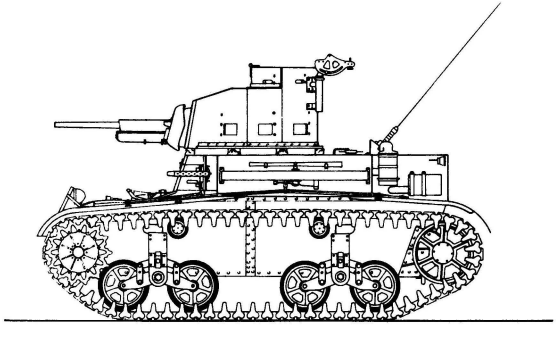
BELOW: This picture shows the rear view of the incomplete E-100 chassis before it was shipped to England. In the background can be seen the limited facilities available for the construction of such a heavy vehicle, at Haustenbeck. (IWM PHOTO)

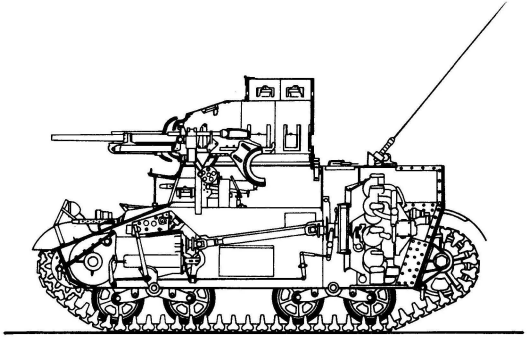












LIGHT TANK M2A4

LIGHT TANK M2 A4 - 1939/42.

At the time of the German Invasion of Poland on 1st September 1939, the standard American Light Tank was the M2 A4. When compared to German Tanks of this period; as regards weight it came in between the Pz.Kpfw II and III, armour protection was very nearly as great as on the Pz.Kpfw III, and the 37mm gun fitted was a superior armour piercing weapon the American Tank was also faster, and everything considered for a vehicle weighing under 12 tons was well up to the standard of tanks of the period.

It was not an advanced design in as much as development, due to restricted finances, had of necessity taken place over a number of years. This steady development had, however, resulted in a reliable suspension, trackwork and transmission features which were to pay dividends in the following years.

After tests with an imported Vickers Armstrong Six Ton Tank in 1931, there appeared the Light Tank T2 and Combat Car T5. Whereas the Light Tank had a single turret and Vickers suspension the Combat Car had dual turrets and vertical volute spring suspension. Comparative tests between these vehicles on 23rd April 1934 proved the Combat Car suspension to be superior. Following these tests it was recommended that vertical volute spring suspension be used in design of the proposed tank. Accordingly in 1935 the Light Tanks T2 E1 and T2 E2 appeared with the vertical volute spring suspension, which was to continue virtually unchanged on all American Light Tanks until the introduction of Torsion Bar suspension in the T 24 in 1943.

The only difference between these two development models was that the T2 E1 had a single turret mounting a .50 cal MG and .30 cal MG as on the T2 whereas the T2 E2 incorporated the dual turret arrangement of the Combat Car T5 with the .50 cal mg in one and the .30 cal in the other. Both vehicles were standardised, the T2 E1 as the Light Tank M2, and after a redesign of turret as the M2 A1 of which a small quantity were built. The Infantry prefered the dual turret arrangement of the T2 E2 and with standardisation of this as the Light Tank M2 A2 production was concentrated on this vehicle. In order to simplyfy the manufacture of the turret, the design these was altered in 1936 from a curved shape to an angular one.

Over the following few years it would appear that approximately 200 M2 A2 were built until the advent of the M2 A3 in 1938. On this model the maximum armour thickness was increased from 5/8"(15 mm) 7/8" (22 mm). Due to increased weight, to maintain a low ground pressure, the bogie units were spaced further apart thereby increasing the ground contact length. To enable the bogie units to be repositioned the rear idler had to be extended beyond the rear of the vehicle. The increased weight without a corresponding increase in the horse power led to the final drive ratio being lowered thereby reducing the top speed. About 70 of this model were produced.

1939 showed the greatest advance, with the introduction of the M2A4. To allow the mounting of the new 37 mm anti tank gun the questionable twin turret system was discarded. Maximum armour thickness was further increased to 1" (25 mm) and the engine compartment was redesigned. On this model the ground pressure rose quite considerably owing to the increase in weight so that flotation was not on a par with earlier models. The engine remained the same but was altered to run on a lower grade petrol. As first introduced there was neither cupola on the turret, nor anti splash guards on the glacis plate, nor was there armour protection for the recoil cylinders and slides of the 37 mm gun. It is not known at present exactly how many Light Tanks M2A4 were produced in total, although an Order for 329 was placed with the American Car and Foundry on 23rd October 1939, and 365 were produced by them between May 1940 and March 1941 when they were superseded by the Light Tank M3. A further 10 were produced at the Baldwin Locomotive Works in April 1942.

Although they were never used in action, Light Tanks M2A4 were the first American Tanks to be used by the British. As for those that remained in America, they were used only as training vehicles.

Technical Specification for Light Tank M 2A4.

Crew: 4
Weight, Combat loaded: 24,125 lbs. 10.77 Long tons.
12.06 Short tons. 10.94 Tonnes.

Performance

Speed, Max. Road: 37.5 m.p.h. (60.35 Km.p.h.)
Max. Gradient: 26 degrees (50%)
Fording depth: 3' 7" (109.2 cm)
Trench crossing: 6' 0" (183 cm)
Step: 2' 2" (66 cm)
Ground pressure: 13.75 lbs/sq,ins (0.966 Kg/sq.cm)

Dimensions

Length overall: 14' 7" (444.5 cm)
Width overall: 8' 4" (254 cm)
Width: 7' 4" (223.5 cm)
Height:(To top of cupola) 8' 4" (254 cm)
Ground clearance: 1'2½" (36.8 cm)
Fire height of gun: 6' 5" (195.5 cm)
Turret ring dia: 4' 0" (122 cm)
Road wheel dia (overall) 1' 8" (50.7 cm)

Trackwork

Centres: 6' 1" (185 cm)
Length on ground: 8' 1" (246 cm)
Width: 11 5/8" (29.5 cm)
Pitch: 5½" (13.9 cm)
Number of links per track: 67.
Type: Rubber Block double pin, Side guides.

Mechanical Details

Engine: Continental W-670-9A 7 cylinder 250 hp Radial air cooled petrol (80 Octane)
Transmission: Synchromesh 5F - IR
Steering: Controlled differential
Suspension: Vertical Volute spring.

Armament

Main: 1 x 37 mm M3 in Gun mount M 20
Calibre, and length in calibres: 37 mm (1.456 ins) L/57
Traverse: 360 degrees. Operation: Hand (10 degrees Right and Left. traverse in mounting - shoulder controlled)
Elevation: plus 20 degrees, minus 10 degrees
Secondary armament:
1 x .30 x cal co-axial
1 x .30 cal flexible bow
2 x .30 cal Sponson mountings.
1 x .30 cal A/A.

Stowage

Ammuntion, main armament: 106 rds.
Ammuntion, secondary armament: 7220 rds.
Internal Fuel capacity: 44.9 Imp.gals. 54 U.S. gals. 204.4 Litres.

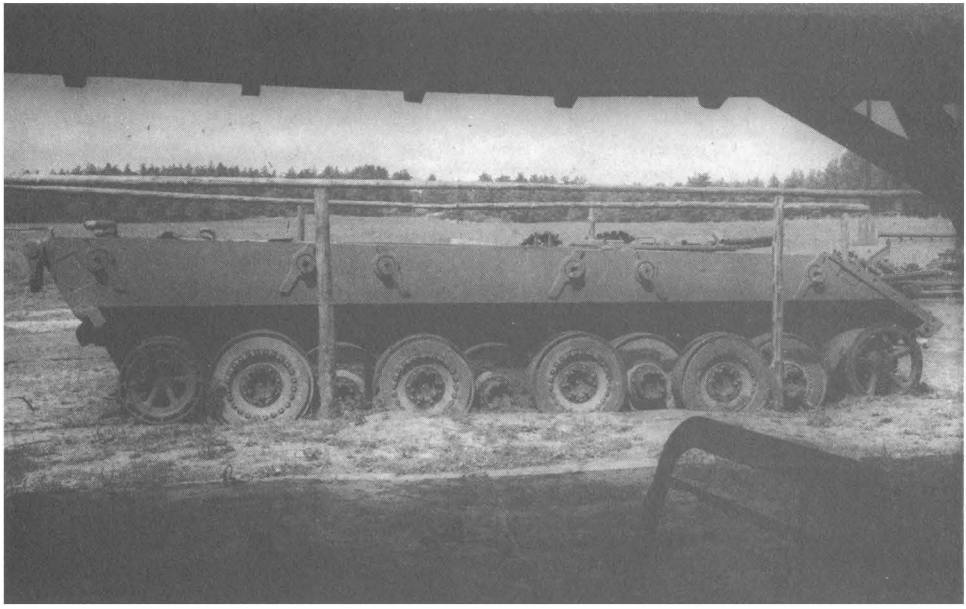
Armour

Type: Rolled plate rivetted construction
Hull, Nose upper: 1" (25.4 mm) at 20 degres.
Nose lower: 1" (25.4 mm) at 63 degrees.
Glasis plate: ½" (25.4 mm) at 68 degrees.
Drivers plate: 1" (25.4 mm) at 18 degrees.
Sides. upper: 1" (25.4 mm) at 0 degrees.
Rear lower: 3/8: (9.4 mm) at 20 degrees.
Rear upper: 3/8" (9.4 mm) at 0 degrees.
Decking: ¼" (6.1 mm) at 90 degrees.
Engine covers: ¼" (6.1 mm) at 90 degrees.

Turret/Superstructure

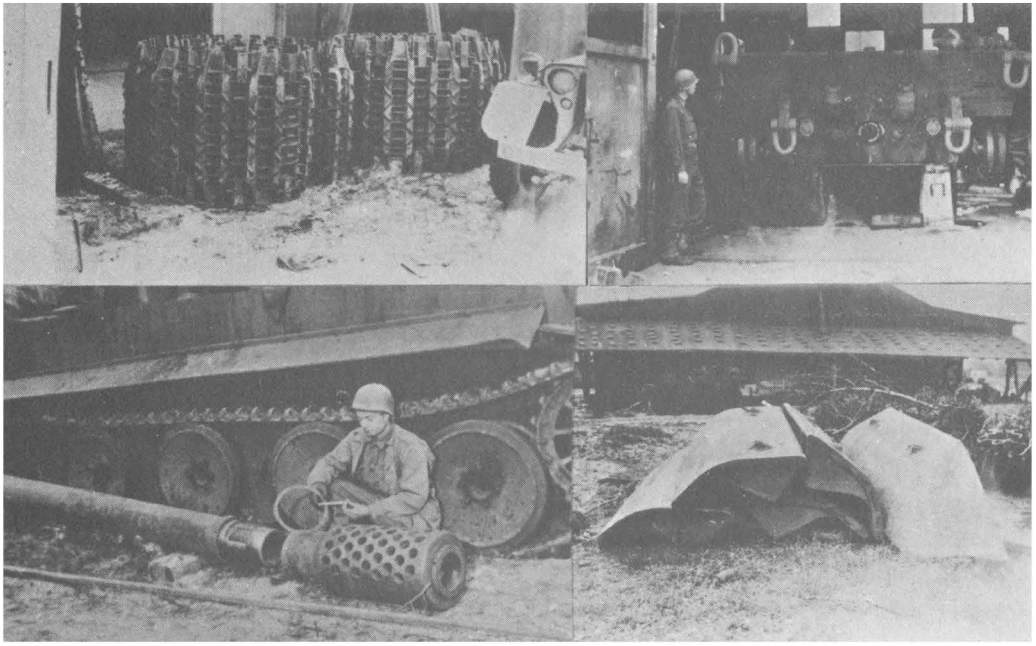
Front: 1" (25.4 mm) at 10 degrees.
Sides + Rear: 1" (25.4 mm) at 0 degrees.
Roof: ¼" (6.1 mm) at 90 degrees.
Cupola: 1" (25.4 mm) at 0 degrees.

NOTE: U.S. Standard Angles: 0 degrees = Vertical.
90 degrees = Horizontal.



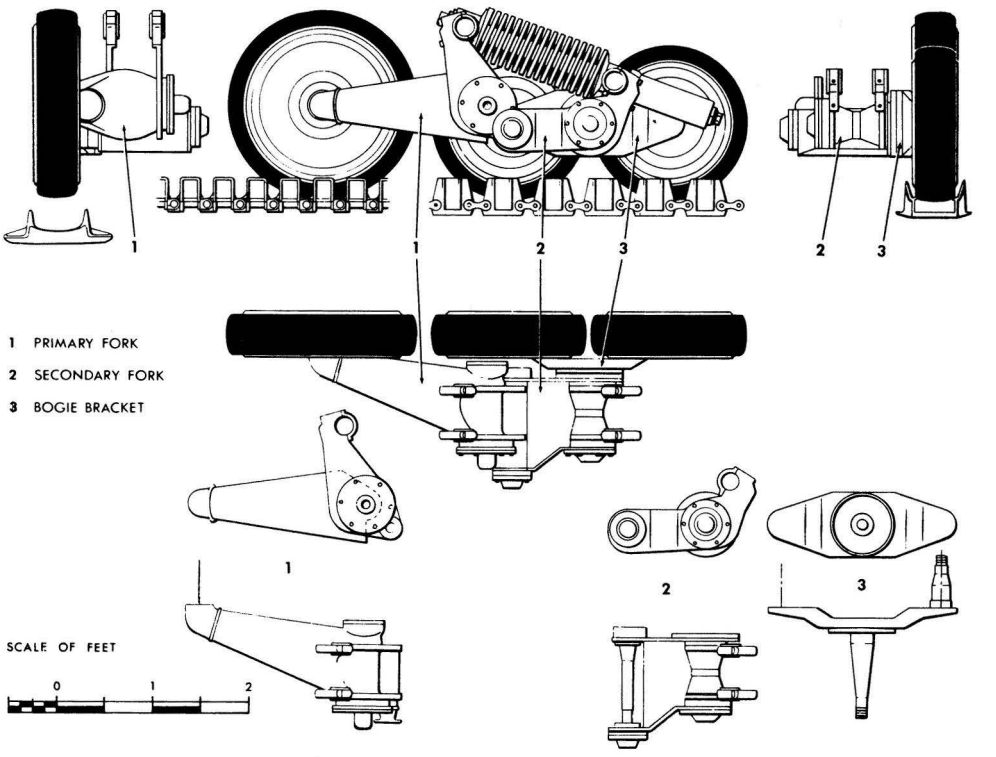
ABOVE: A view of the E-100 chassis from the left hand side. As can be seen the running gear is almost complete in its 'Battle order' form. However, the sprocket rings from the drive sprocket are missing and thus the Battle tracks have not been fitted. (IWM PHOTO)

BELOW: Photo No.1. Another rear view of the E-100 chassis, this time shown just after capture by U.S. forces. The immense size of the 140 ton vehicle can be appreciated by comparison with the American soldier close by.
Photo No.2. The heavy armour shields which were to be fitted to the E-100 when in battle.
Photo No.3. The specially designed Battle tracks for the E-100 which were 3' 3" wide (100 cm)
Photo No.4. An American soldier examining the muzzle brake of the 15 cm KwK 44 which was to have been fitted in the Turret of the E-100 (U.S. Official Photos)



VICKERS 'SLOW MOTION' SUSPENSION

by A.J.Gooch.



The Vickers 'Slow Motion' suspension first appeared in the form illustrated on the A9.E1, pilot of the Cruiser Tank Mk.I, of which the following quantities were produced:-

A9.E1 Pilot	T 1356 MEE 887	BMM 133
50 ordered June 1937	T 3493 - T 3542	(HMH 848 - HMH 897) Vickers
75 ordered	T 7196 - T 7270	(PMV 552 - PMV 626) Harland & Wolff

(Bellona Prints Series 17, No.65 (UK)

The suspension was used on the Cruiser Mk I (A9), Cruiser Mk.II (A 10) and the Valentine, including its variants Bishop and Archer. Each suspension unit carries three bogie wheels, one 24" dia. and two 19½" dia, connected together through a 'slow motion' springing arrangement incorporating a large single coil spring and a totally enclosed telescopic hydraulic double-acting shock absorber.

Each suspension assembly consists of a Primary Fork, Secondary Fork, Bogie Bracket and Spring/Shock Absorber unit.

The Primary Fork pivots on a Pivot Pin mounted between the Inner and Outer Suspension Support Brackets (not shown for clarity), both of which are bolted to the hull. One end of the Primary Fork carries the 24" dia. wheel whilst the other end has a short extension which carries the Secondary Fork Pivot Pin, upon which one end of the Secondary Fork pivots. The other end of the Secondary Fork receives the pivot pin from the Bogie Bracket. The Bogie Bracket carries the two small bogie wheels. On both the Primary Fork and Secondary Fork are Trunnion Brackets, between which is mounted the Spring/Shock Absorber unit.

The following vehicles incorporating this suspension are on display at the RAC Tank Museum, Bovington, England.

Cruiser Tank Mk I (A9)	T 7230 (PMV 586)
Cruiser Tank Mk IIA.CS (A 10)	T 9261
Valentine Mk I	T 16065

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